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RE-EVALUATION OF THE SOUTHERN PINE BEETLE STATUS OF THE
STRONG RIVER DISTRICT, BIENVILLE NATIONAL FOREST

U. S. Forest Service
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SOUTHEASTERN AREA, STATE AND PRIVATE FORESTRY
RESOURCE PROTECTION UNIT, FOREST INSECT AND DISEASE MANAGEMENT GROUP

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STRONG RIVER DISTRICT, BIENVILLE NATIONAL FOREST

by -

Daniel B. Twardus and James D. Smith^{1/}

INTRODUCTION

A biological evaluation was conducted on the Strong River District of the Bienville National Forest on February 24, 1977. The purpose of the evaluation was to determine the current status of southern pine beetle (*Dendroctonus frontalis* Zimmerman) populations in the area and to relate the status to that reported in the last biological evaluation of the Strong River District (Rogers and Twardus, 1976). In that report, SPB populations were observed to be low. *Ips* species and black turpentine beetles, *Dendroctonus terebrans* (Oliver), appeared to be the primary invaders of susceptible trees. Due to the extremely high biotic potential of the SPB, however, it was recommended in the last report that SPB control procedures be initiated on the Strong River District.

Strong River District personnel have made a good attempt to initiate SPB control measures. Since the last evaluation, 446 MBF of infested timber have been salvage removed. Operator supervision has been accomplished as much as possible with the limited funding available. When project funding becomes available, operator supervision and rechecking treated spots for infested material that may be left can be fully accomplished. This is essential for effective SPB control.

METHODS

Standard aerial sketch-map procedures were used for this evaluation, except that survey coverage was 100 percent.^{2/} Spots of red and/or fading trees were recorded and accurately plotted on Forest Service Class A maps. Aerial survey results were then corrected according to the data of Aldrich, *et al.*, (1958) to compensate for observer error. Five SPB infestations and two salvage areas were ground checked by FI&DM personnel.

^{1/} Entomologists, U.S.F.S., Southeastern Area, State and Private Forestry, Forest Insect and Disease Mgt. Group, Pineville, LA.

^{2/} Detection of Forest Pests in the Southeast. 1970. USDA, USFS, SA, S&PF, Div. of FPM, Publ. S&PF-7, Atlanta, GA. 51 p.

TECHNICAL INFORMATION

Causal agents - *Dendroctonus frontalis*, Zimmerman

- *Dendroctonus terebrans* (Oliver)

- *Ips* species - *avulsus* (Eichoff), *grandicollis* (Eichoff), and *calligraphus* (Gemer)

Host trees attacked - Loblolly, *Pinus taeda* L., and shortleaf, *Pinus echinata* Mill.

Type of Damage - Death of the tree is partially the result of cambial mining by the SPB as it constructs its gallery. The beetle also introduces blue stain fungi, *Ceratocystis* sp., which slow down or block conduction of water in the xylem.

Ips damage is similar to the SPB. *Ips* species may attack separately, at the same time, or in conjunction with other bark beetles (see Fig. 1).

The black turpentine beetle attack is confined to the lower portion of the tree bole (see Fig. 1) and attacks do not always prove fatal to the tree. As with the above mentioned beetles, damage is due to cambial mining.

Life cycles of the three types of bark beetles causing damage in this district are illustrated in Fig. 1.

RESULTS AND DISCUSSION

The results of this evaluation are summarized in Table 1. There are currently 56 SPB spots containing an estimated volume of 55 MBF of affected timber. In the last evaluation, 93 spots were observed with 44 MBF of affected timber. This decrease in spot numbers is due to the salvage removal operations that have taken place during the fall and winter months.

As in the last evaluation, SPB spot occurrence is greatest in the western and southwestern portions of the district (see Fig. 2). Spot size (numbers of infested trees), however, has generally increased. In the last evaluation, spot size ranged from 1 to 30 trees, while in the present evaluation, spot size ranges from 1 to 150 trees. Two of these spots were heavily stocked pulpwood stands which account for a proportionally greater increase in tree numbers than tree volume. This increase in spot size is reflected in the 1.1:1 ratio of green infested (fresh attacks) to red and fading trees observed. This ratio indicates the spot growth occurring throughout the district.

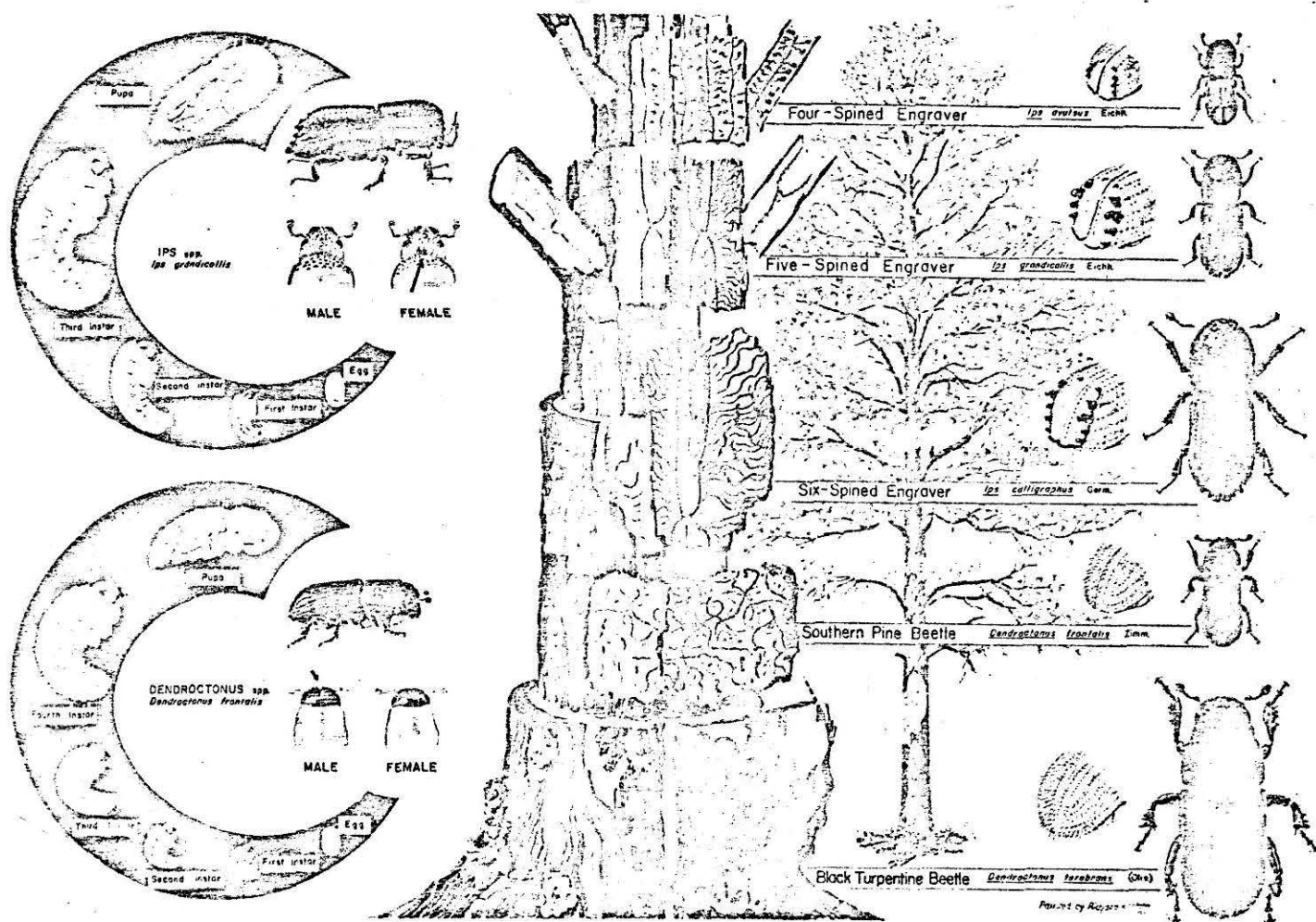


Figure 1. Southern Pine Bark Beetles.

Table 1. Summary and comparison (Sept. 1976 versus Feb. 1977) of aerial and ground survey data, southern pine beetle evaluation, Strong River District, Bienville N.F., Mississippi

		Ownership Unit	
		Bienville N.F. - Strong River R.D.	
		September	February
1. Results compiled from data collected during the aerial phase of the evaluation:			
Survey type	Aerial sketch map	Aerial sketch map	
Date of aerial survey	9/23/76	2/22/77	
Percent survey	50%	100%	
Total acreage surveyed		232,960	
Total acreage of Forest Service land		90,730	
Susceptible host type acreage of Forest Service land		63,055	
Total number of spots within the survey boundary	156.9	46.0	
Total number of spots on Forest Service lands	93.2	56.07	
Spots per M acre of host type Forest Service lands	1.48	.89	
Average spot size (trees) Forest Service lands	4.94	10.27	
Range of spot sizes (trees) Forest Service lands	1-30	1-150	
Reds and faders/M acres host type on Forest Service lands	7.30	9.14	
2. Results compiled from data collected during the ground and aerial phases of the evaluation:			
Date of ground phase	9/27/76	2/24/77	
Infested trees per M acre of host type Forest Service lands	7.95	19.28	
Total number of infested trees on Forest Service lands	501.6	1,215.40	
Total volume of infested trees on Forest Service lands	43.9 MBF	38.7 MBF	
Total number of affected trees on Forest Service lands	501.6	1,728.06	
Total volume of affected trees on Forest Service lands	43.9 MBF	55.0 MBF	
Ratio of green infested to total red and fading trees	0.57:1	1.1:1	

Volume - BF - based on Scribner decimal C log rule. Cords converted to bd. ft. based on 500 bd. ft. per cord.

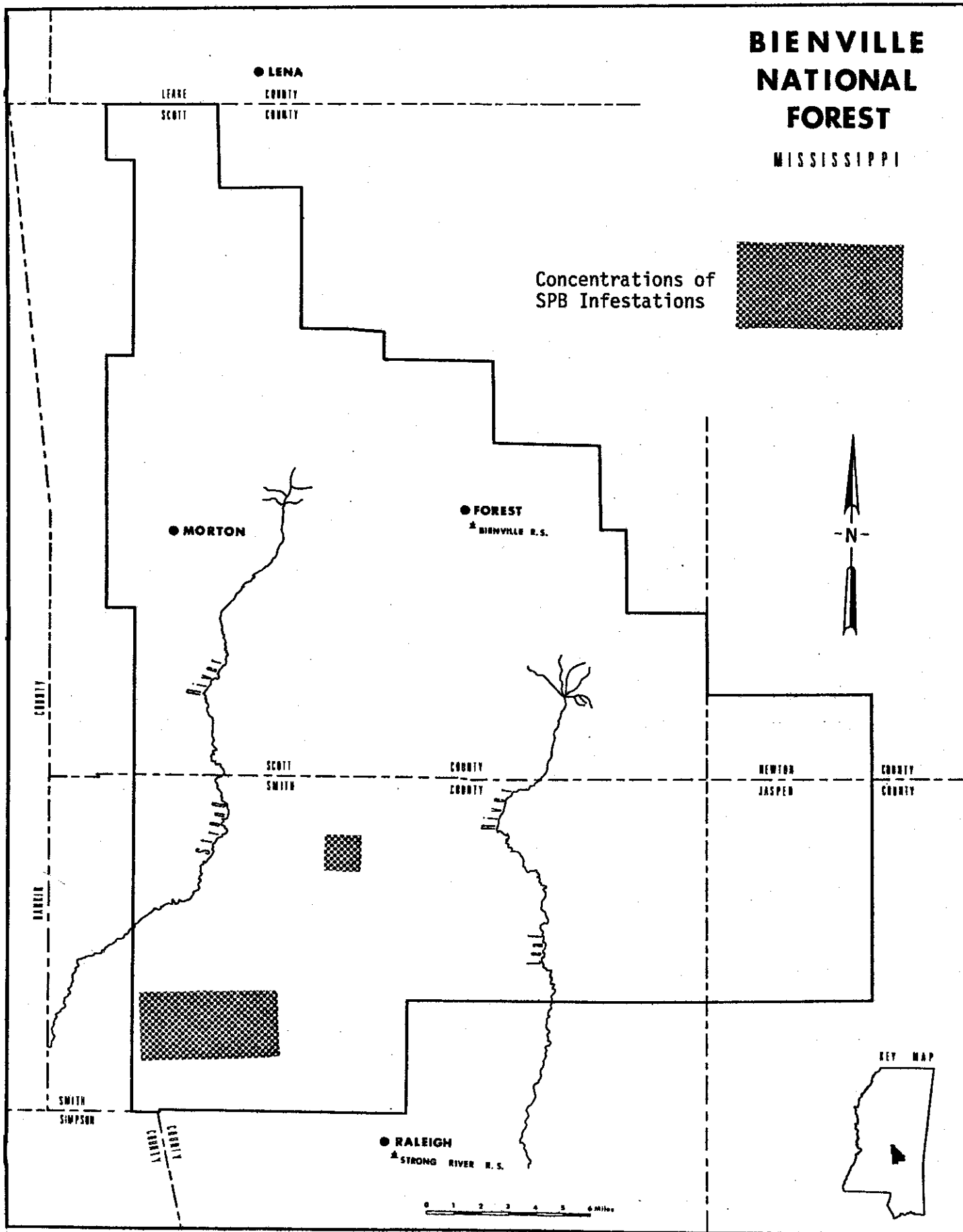


Figure 2. Southern Pine Beetle Infestations, Strong River District, Bienville N.F.

All of the spots visited were found to be actively infested with SPB. Red and fading trees examined had all larval stages. Green infested trees examined contained the early larvae brood stage.

In this evaluation, *Ips* and black turpentine beetles were not observed as primary invaders of susceptible hosts. As suggested in the last report, the SPB has a very high biotic potential under favorable conditions. When these conditions (such as overstocked stands, weakened stands, lightning, or other damaged trees) exist, the SPB numbers increase at a greater rate than other bark beetles. This allows the SPB to eventually replace other bark beetles as the primary invader of susceptible pine stands. This, then, appears to be the course of events occurring on the Strong River District.

In two of the five spots visited, lightning damage appeared to be the initial cause of bark beetle attack. Lightning-struck trees are weakened and can be colonized by bark beetles more easily than healthy ones. When bark beetle populations are low, these damaged trees apparently serve as attraction centers for continuing activity by the beetles.

The remaining three spots examined were in stands with pine basal area of 150 sq. ft. per acre or more. Research indicates that stands with high densities are more susceptible to attack by bark beetles (Coulson, *et al.*, 1974, Ku, *et al.*, 1976, Lorio, 1968). In east Texas, Hedden^{3/} found that SPB spots with less than about 120 ft.² of pine per acre were inactive or going inactive.

SPB control success is dependent upon 1) reducing beetle numbers and 2) application of forest management and silvicultural procedures which eliminate or modify predisposing causes of outbreak conditions. The more important stand conditions related to beetle outbreak are:

- 1) Recently killed or damaged trees, i.e., lightning strikes, windfalls, ice damage.
- 2) Overmature trees. These trees are natural focal points for bark beetle infestations. In the unmanaged forest ecosystem, bark beetles play a significant role in eliminating the mature and overmature components. This process results in the release of the understory vegetation.
- 3) Stands which are too dense or stagnated. As stated above, research indicates that a relationship exists between high stand density and susceptibility to bark beetle attack.

^{3/} Hedden, R. L. 1976. Southern pine beetle spot growth and inactivity in east Texas. (Unpubl.)

In addition, reduced radial growth, interpreted to indicate declining tree vigor, has been related to increased susceptibility to bark beetles (Coulson, 1974; Ku, *et al.*, 1976).

Post suppression evaluations

Two salvage areas on the Strong River District were examined. It appeared that in both areas, salvage operations were temporarily discontinued due to wet weather conditions.

Since infested trees remained in both salvage areas, it appeared that District personnel would have to recheck the salvage areas to insure that all infested trees are removed. SPB project control funding will help in the accomplishment of this procedure.

RECOMMENDATIONS

1. SPB control operations should continue on the Strong River District. If the availability of salvage operators is limited, their efforts should be concentrated on those infestations with the greatest numbers of actively-infested trees in stands with high basal areas. District personnel can then pile-and-burn or chemically treat the smaller infestations. These procedures are outlined in the Project Control Plan for the Bienville National Forest.
2. SPB infestations which occur in overstocked stands or overmature stands should be given priority treatment. Also, appropriate silvicultural treatment should be prescribed in these areas in order to avoid chronic SPB outbreaks. These prescriptions should be consistent with current resource management plans.

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